

REMARKS

Applicants request favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

The specification has been amended to place the subject application in better form. A new abstract has also been presented in accordance with preferred practice. By separate paper, Applicants request approval to label Figures 5 and 6 as -- PRIOR ART --, in accordance with the Examiner's request. No new matter has been added by these changes.

Claims 1-30 are presented for consideration. Claims 1, 24-26, 29 and 30 are independent. Claims 1, 18, 24-26 and 28-30 have been amended to clarify features of the invention. Support for these changes can be found in the original application, as filed. Therefore, no new matter has been added.

Applicants request favorable reconsideration and withdrawal of the rejections set forth in the above-noted Office Action.

Claims 18 and 19 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. The Examiner objected to particular phraseology in claim 18. To expedite prosecution, Applicants have changed the dependency of claim 18 in light of the Examiner's comments. Applicants submit that this change overcomes this rejection. Such favorable indication is requested.

Turning now to the art rejections, claims 1-26 were rejected under 35 U.S.C. § 102 as being anticipated by Japanese patent document no. 5-217837 to Nishida et al. Claims 1-26 also were rejected under 35 U.S.C. § 103 as being unpatentable over Applicants' background

statement with respect to Figures 5 and 6 in view of either the Nishida et al. document or U.S. Patent No. 5,757,160 to Kreuzer. Applicants submit that the cited art, whether taken individually or in combination, does not teach many features of the present invention as recited in claims 1-30. Therefore, these rejections are respectfully traversed.

In one aspect of the invention, independent claim 1 recites a stage apparatus that includes a stage movable along at least one axis, a laser head for generating a laser beam, an optical unit which is mounted on the stage and splits the laser beam into reference and measurement beams, a mirror which is arranged outside the stage and reflects the measurement beam, and a detector which is arranged outside the stage and detects an interference beam of the reference and measurement beams.

In another aspect of the invention, independent claim 24 recites a stage position measurement method that includes steps of generating a laser beam from a laser head, irradiating an optical unit mounted on a movable stage with the laser beam, splitting the laser beam into reference and measurement beams by the optical unit, irradiating a mirror arranged outside the stage with the measurement beam, reflecting the measurement beam which irradiates the mirror, making the reflected measurement beam interfere with the reference beam to generate an interference beam, detecting the interference beam and measuring a position of the stage on the basis of a signal concerning the detected interference beam.

In yet another aspect of the invention, independent claim 25 recites a projection exposure apparatus that includes as a reticle stage and/or a wafer stage, a stage apparatus having a stage movable along at least one axis, a laser head for generating a laser beam, an optical unit which is

mounted on the stage and splits the laser beam into reference and measurement beams, a mirror which is arranged outside the stage and reflects the measurement beam, and a detector which is arranged outside the stage and detects an interference beam of the reference and measurement beams.

In still other aspects of the invention, independent claim 26 recites a semiconductor manufacturing method, independent claim 29 recites a semiconductor manufacturing factory, and independent claim 30 recites a maintenance method for a projection exposure apparatus, which is installed in a semiconductor manufacturing factory. These claims recite features similar to those recited in the foregoing independent claims.

Applicants submit that the cited art does not teach or suggest such features of the present invention, as recited in the independent claims.

The Nishida et al. document in Figure 1 shows a detector and an interferometer arranged on an X-Y table, with a mirror being arranged outside of the X-Y table. Figure 2 of that document, labeled as "PRIOR ART," shows the detector arranged outside of the X-Y table, but the mirror and interferometer arranged on the X-Y table. Applicants submit, however, that the Nishida et al. document does not teach or suggest a detector and a mirror both arranged outside of a stage for detecting an interference beam of reference and measurement beams, in the manner of the present invention recited in the independent claims. Rather, in the Nishida et al. document, the detector or the interferometer are arranged on the X-Y table so that optical fibers must be laid out on the X-Y table. This complicates the wiring of the X-Y table and is cumbersome.

The Kreuzer patent discloses a mirror arranged outside of a stage, but does not teach any arrangement of a detector. Also, in this patent, light is carried through the fiber optic cable so that, as in the arrangement in the Nishida et al. document, the cables must be laid out on the stage, again complicating the wiring of the stage.

Applicants submit that the present invention is able to reduce the size of the apparatus, as a whole, without complicating the wiring of the stage, because the detector and the mirror can be arranged outside the stage. Applicants submit that the Nishida et al. document and the Kreuzer patent do not teach or suggest such features of the present invention, as recited in the independent claims.

Applicants further submit that their background statement with respect to Figures 5 and 6 of the subject application does not cure the deficiencies noted above with respect to either the Nishida et al. document or the Kreuzer patent. Specifically, the Examiner relies on Applicants' background statement with respect to Figures 5 and 6 for showing the general structure of a stage apparatus. As noted by the Examiner, however, that background statement does not teach or suggest the salient features of Applicants' present invention as recited in the pending claims.

For the foregoing reasons, Applicants submit that the present invention, as recited in independent claims 1, 24-26, 29 and 30, is patentably defined over the cited art, whether that art is taken individually or in combination.

The dependent claims also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Further individual consideration of these dependent claims is requested.

Applicants further submit that the instant application is in condition for allowance. Favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action and an early Notice of Allowance are requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,



Attorney for Applicants
Steven E. Warner
Registration No. 33,326

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200

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